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local details. These are presented under the following heads: the Terminal Moraine; the Drift of the Appalachian Province; the Drift of the Highlands; the Drift of the Triassic Plain; Stratified Drift of Late Glacial Age South of the Moraine; and Extra-Morainic Glacial Drift. This extra-morainic drift is referred, doubtfully, to the Kansas epoch. A pocket at the end of the volume contains several maps, among them one showing the direction of glacial movements and one giving the distribution of the glacial drift.

A. P. B.

The New York City Folio, of the Geologic Atlas of the United States.
U. S. Geological Survey, Folio No. 83. Washington, D. C.,
1902.

This folio includes the Paterson, Harlem, Staten Island, and Brooklyn quadrangles of New York and New Jersey, containing more people than any similar area in the New World, the population by the last census being 4,560,800. In plan the work is similar to other Survey Folios giving geological history and resulting geographic features and resources. As with the others, the inside cover pages contain a copious explanation, a kind of key to the terminology and the elaborate maps which are used.

The general geography is described by Richard E. Dodge and Bailey Willis. The drainage features are given in detail in connection with a map, which also shows depths to ten fathoms by contour lines. The geology is given in a series of papers by several authors. The outline of geologic history is by Bailey Willis, and is followed by more detailed accounts of the formation and of the periods to which they belong. Dr. F. J. H. Merrill describes the metamorphic crystalline rocks. Of these the chief representatives are: the Fordham Gneiss, which is pre-Cambrian; the Poughquag Quartzite, which is Cambrian; the Stockbridge Dolomite, a Silurian formation continuing from Western New England; and the Hudson Schist, equivalent to the Berkshire Schist of New England. Various younger rocks are igneous in character, and occur as intrusives in those named above. The Stockbridge Dolomite furnishes the marble of Tuckahoe, and, by the ease of its erosion, has determined along its belts the existence of the now submerged valleys which have made New York what it is.

A much more detailed paper is by Mr. N. H. Darton, and deals with the Jura-Trias, here known as the Newark Group, consisting of reddish brown shales and sandstones, and having, in association

with its strata, those sheets of volcanic rock which form the Palisades of the Hudson and the Watchung or Orange Mountains. Even the non-geological reader of the Folio will find Mr. Darton's Fig. 3 of much interest, as it shows the relations of the sandstones and the lava masses, from the gneiss, on the east of the Hudson, westward, to the gneiss of the New Jersey Highlands beyond Orange. We have the sedimentary rocks dipping westward with the Palisades trap, the Snake Hill trap, and the first, second, and third Watchung traps, in order, going westward. Below the geologic section is drawn a true profile of the surface, without vertical exaggeration, and the two taken together are fitted to give the reader true and permanent information. The Watchung lava sheets and the Palisades are described in sufficient detail to make the Folio of much value as a local guide. The Palisades are formed by the intrusion of a single sheet, which at some points is known to have been 1,000 and more feet in thickness.

Mr. Willis and Dr. Arthur Hollick give short sketches of later geologic events, which, however, have left small records in this immediate field, until we reach the Pleistocene formations, which are described at length by Professor R. D. Salisbury, from his studies in connection with the Geological Survey of New Jersey.

An introductory statement of general principles is given, which will aid the general reader, and the local description begins with a map showing the direction of glacial movements and the course of the terminal moraine. The latter crosses New Jersey by Morristown and Perth Amboy, and then swings to the northwest across Staten Island, and begins its long extension, by Brooklyn and Jamaica, through Long Island. The drift is usually thin, outside of the morainic belts, and glacial scratches and mouldings of the rocks are frequent, especially east of the Hudson River and north of East River and the Sound, as at many points in Central Park. The post-glacial changes are moderate in amount, and consist of stream and shore erosion, weathering of the glacial drift, the blowing of sand, accumulation of sand by waves, and the growth of beds of peat.

A short section by Bailey Willis and R. E. Dodge is devoted to physiographic features, including the origin of New York Harbour, the development of shore features, the relations of valleys and of heights, and the water and wind gaps. The development of valleys on the dolomite, referred to by Dr. Merrill, is here more fully treated. The effects of physiographic features on culture are briefly treated, and the text closes with an account of the water

supply of New York City, by Henry A. Pressey. The four quadrangles are shown in contoured maps, while a second set gives the historical geology, and a third the surficial geology. There is a structural map of the Harlem quadrangle, and two illustrative sheets reproduce views of the Palisades, the Watchung traps, the Falls of the Passaic River at Paterson, the terminal moraine on Staten Island, and glaciated rock surfaces in Bronx Park. The Folio is the best guide to the geology of the region, while its inconvenient size finds ample compensation in the elaborate maps which compel the use of the folio form. A. P. B.

The Tanganyika Problem. An Account of the Researches undertaken concerning the Existence of Marine Animals in Central Africa. By J. E. S. Moore, F.R.G.S. London: Hurst & Blackett, Ltd., 1903.

This book is the result of Mr. Moore's two expeditions to the lake region of Central Africa especially to study the occurrence of animals of a distinctly marine type in Lake Tanganyika, and the problem of a former connection between the sea and the lake by which the animals were originally introduced. The volume, being thus devoted to the consideration of animal life in the lakes and of the ancient physiography of Central Africa, is almost wholly biological and geological; it is geographical, however, so far as it deals with the present distribution of animal life and with the former physical geography of Africa. The value to zoology of the studies undertaken is evident from the fact that nearly 200 entirely new animal types were discovered; and the book is the only one containing an extended illustrated account of the animals found in the great African lakes. The difficulty of accounting for the existence of the marine types in Tanganyika is increased by the fact that none of them is found in the other central lakes from Rudolf to Bangweolo and Nyasa. The absence of these shells from the other lakes is opposed to the theory that the marine types reached Tanganyika through the Red Sea or the Indian Ocean; and Mr. Moore's geological studies incline him to the view that they may have inhabited a Jurassic sea which is supposed to have extended over a large portion of the Congo basin, a part of it occupying the Tanganyika area. Some of Mr. Moore's hypotheses are not fully accepted either by biologists or geologists; but all will admit the thoroughness of his investigation of the Tanganyika fauna, the great merit of his descriptions and illustrations